

REGIONAL ANESTHESIOLOGY

This series of articles began in the last issue of the *Newsmonthly* with "An Historical Sketch on Local Anesthesia". Dr. I. B. Bender, noted author and teacher, discusses below another important aspect of the field of regional anesthesiology.

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STERILIZATION IN LOCAL ANESTHESIA

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■ With the continuing advancements in local anesthesia in dentistry and the extensive development of oral surgery, sterilization of the injection site and the area of operation becomes an important consideration for the dentist. Sterilization has not been emphasized or appreciated because of the efficient defense mechanisms of the body. Nevertheless, basic bacteriologic principles should be adhered to in order to prevent systemic complications and infections. This is especially true in patients who have a history of systemic disease, such as rheumatic heart disease, diabetes, tuberculosis, etc.

Considering the myriad of organisms that are present in the mouth and the extent of surgery that is performed, it is remarkable that so few postoperative infections occur. This can be attributed to the rich blood supply of the oral tissues

and the efficient antibacterial action of the blood and the reticuloendothelial system. As a general rule, the better the blood supply of a tissue, the less liable it is to invasion by pyogenic bacteria.

Numerous investigators in the field of dental bacteremias in humans¹ and animals² have shown that blood samples taken immediately after extraction show a much higher incidence of bacteremia than blood samples taken ten minutes later. Reichel's experiments² also demonstrated that smaller numbers of organisms were present in the blood samples of dogs with the passage of time. Blood samples removed through catheters in different parts of the circulatory system also demonstrated a reduced number of bacteria in the blood stream, showing that blood destroys bacteria.³

The absence of bacterial complications may also be due to the fact that the patient possesses a higher bacteriolytic titer against his own organisms than organisms of other individuals. This was ex-

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perimentally demonstrated when organisms taken from the periapical tissues and mixed with the patient's blood were destroyed at a lower dilution than when these same organisms were mixed with a different patient's blood.⁴

Role of Saliva

The saliva also aids in curtailing infection since it possesses some bactericidal and chemotactic activity. An increased salivary flow exerts a dilution effect on organisms, thus decreasing the concentration of organisms in the saliva. An increase of salivary excretion reduces the bacterial count of the oral cavity. Bacterial counts of the oral cavity have invariably been higher following reduced activity of salivary flow. Fluctuations in bacterial counts could be attributed to variations in the flow of saliva.

Another efficient mechanism for the reduction of bacteria is *suction currents*.⁵ Bacteria introduced into the mouth are drawn backwards toward the esophagus, swallowed, and killed by gastric secretions. The mechanical flushing effect of an abundant flow of saliva is probably the most important restrictive role that saliva exercises on the micro-organisms of the mouth.

Sterilization of the Oral Cavity

Attempts at sterilization of the area of the oral cavity prior to in-

jection of an anesthetic solution have been made, using various antibacterial agents. In most instances the time allotted for this procedure in itself prevents sterilization from taking place. In spite of this fact, very few infections occur following intraoral injections, even where no attempt has been made to sterilize the tissues.

The point is often discussed of whether an injection in the oral cavity can produce a transient bacteremia by forcing the bacteria on the surface into the deeper tissues, or possibly into the capillaries, providing entry into the blood circulation. This question was raised by Brown⁶ in his studies on bacteremias. On the premise that this is an important factor to consider, he advocated the use of general anesthesia.

Schlack⁷ showed that drying the mucosa with a blast of warm air was sufficient to reduce markedly, and, in some instances, completely eliminate, micro-organisms from the mucosa. This principle was confirmed in another study in which the injection site was dried with sterile gauze sponges.⁸

The mechanical drying of the injection area may be a more efficient method than the application of an antibacterial agent, especially if the time factor is considered very seriously.

In bacteremia studies of 400 patients,⁹ it was demonstrated that no positive blood cultures were present in blood samples taken immediately following infiltration and block anesthesia, except in two cases. The organisms recovered were *staphylococcus albus*. These were considered to be contaminants from the skin, since the blood was taken from the median cubital vein. The procedure followed was that of drying the injection area with a sterile gauze sponge. No antibacterial agent was used.

The most efficient method of sterilization of mucosa for injection or aspiration biopsy is as follows:

1. Wash hands, scrub nails and fingers.
2. Thoroughly dry the mucous membrane at the site of puncture with a gauze sponge held in a thumb forceps.
3. Apply a surface anesthetic-antiseptic either by a spray or by means of cotton-wound wooden applicators.
4. Cover the surface with a small sterile sponge and allow one minute to elapse.
5. Rub the mucosa dry again with the sponge and inject the anesthetic solution.

In order to prevent cross infections from patient to patient, it is best to boil or autoclave all needles for 20 minutes. Routine boiling or cold sterilization is inadequate to destroy the virus of hepatitis.¹⁰ It has been shown that this virus can be present in a recovered individual for as long as one to two years and a concentration of one part in a

million can produce the disease in another individual. The safest procedure is to discard the needle after use if the patient gives a history of infectious hepatitis. All surgical instruments should be autoclaved for one hour or more in known cases of hepatitis. Platinum iridium needles may be sterilized by flaming to a dull red heat.

Reduction of Oral Bacteria

Reduction of bacterial population of the mouth with the use of saline rinses, iodine washes¹¹ and various detergents¹² has produced some beneficial results. In most instances, however, the reduction could not be sustained. In a matter of 20 to 30 minutes, the bacterial counts return to or even exceed the original count.

The use of a single troche composed of Neomycin®, Polymyxin® and Bacitracin®, held in the mouth for 20 minutes prior to surgery, reduced the bacterial population by 90 to 95 per cent. This reduction was sustained for 4 to 6 hours. At the end of this time the bacterial count exceeded the initial count.¹³

It was also demonstrated that the prophylactic use of the troche alone markedly decreased postextraction bacteremia. Whereas the control studies showed an incidence of 85 per cent positive cultures, this particular troche group showed 53 per cent positive blood cultures. The re-

duction was equally as effective when compared with parenteral administration of 400,000 units of penicillin.¹⁴

The use of any agent, therefore, that reduces the bacterial population of the mouth preoperatively is beneficial, particularly for patients with a history of rheumatic heart disease.

A cleaner operating field also ensures less possibility of complications in blood clot formation, especially in periodontal surgery. In addition, cases in which general anesthesia is accompanied by intubation would probably result in fewer bronchial complications.

It is not suggested that the troche be a substitute for, but an adjunct to, parenteral antibiotics whenever indicated for oral surgery procedures.

While the defense mechanisms of the body are such that little infection may occur following surgery in the oral cavity, measures to prevent possible complications should be taken.

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